

ASX Release

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## Successful Completion of First Multi-Unit Flash Joule Heating Operations Campaign

*Successful campaign validates sustained parallel operation of three FJH units and advances scale-up program*

### HIGHLIGHTS:

- Three FJH units successfully operated simultaneously during a 12-hour operating campaign with above expected availability and utilisation results
- 18 successful batches completed and approximately 0.3 tonnes of inert material processed during the campaign
- Operating throughput achieved was broadly consistent with processing reactor feed volumes derived from several tonnes per day of incoming commercial feedstocks following preprocessing and upgrading
- 83% availability and approximately 100% utilisation achieved during active operation of three FJH units running simultaneously, providing confidence in the robustness and scalability of the FJH operating platform.
- Campaign completed without any safety incidents and with zero lost-time injuries (LTI)
- Critical operating, instrumentation, controls and engineering data generated to support future scale-up activities

**Metallium Limited** (“Metallium” or the “Company”) (ASX: **MTM**; OTCQX: **MTMCF**; OTCQX ADR: **MTLMY**) is pleased to announce the successful completion of its first multi-Flash Joule Heating (FJH) Reactor-unit ‘hot’ commissioning campaign at the Company’s technology development facility in Texas. The campaign was designed to evaluate sustained operation of multiple FJH reactors running in parallel and represents an important milestone in the scale-up and commercial development of the Company’s proprietary FJH technology platform.

**Table 1: Campaign Performance Metrics**

Metric	Result
Active FJH Units	3
Campaign Duration	12 Hours
Successful Batches	18
Material Processed in Reactors	~0.3 tonnes*
Availability	83%
Utilisation	~100%
Safety Incidents	0
Lost Time Injuries	0

**Important Scale-Up Milestone:** Commercial deployment of FJH technology is expected to involve multiple reactor units operating in parallel. Successful operation of three units simultaneously under sustained operating conditions represents a significant engineering milestone in advancing the technology from laboratory-scale validation toward demonstration-scale deployment. The campaign successfully demonstrated:

- Sustained multi-unit operation over a full operating shift with an impressive 83% availability and near 100% utilisation factor
- Stable fluidisation and material handling across multiple operating trains.
- Coordinated operation of three independent processing trains with our complete 12-person team encompassing engineers, operators and safety personnel.
- Repeatable batch processing, operating procedures & reliability of mechanical systems under extended operation.
- Successful operation of integrated control systems to extract valuable human machine interface (HMI)-housed operating data for future automation and process optimisation.

\*Prepared feed material refers to feedstock following preprocessing and upgrading. Depending on feedstock type, the mass reporting to the FJH reactor may represent only a fraction of the original incoming material.



Figure 1: Commissioning Team

**Managing Director & CEO Michael Walshe commented:** *“The successful completion of our first multi-unit FJH operations campaign represents an important milestone in the development of our FJH technology platform. While the campaign was intentionally focused on mechanical performance, fluidisation behaviour and process control rather than chlorination chemistry or metal recovery, successful sustained operation of three units simultaneously provides valuable confidence in the scalability of the technology and generates important engineering data for future development programs.*

*“Importantly, the campaign achieved 83% availability and approximately 100% utilisation during active operation, exceeding our internal expectations for a first multi-unit commissioning campaign. While the campaign utilised inert test media, the operating rates demonstrated were broadly consistent with **processing reactor feed volumes derived from several tonnes per day of incoming commercial feedstocks following preprocessing and upgrading.** This provides highly encouraging early evidence of the scalability of the platform and the suitability of the FJH architecture for larger-scale deployment.*

*“The campaign **demonstrates our ability to operate multiple FJH units in parallel and establishes a strong foundation for the next phase of development,** which will involve multi-unit chlorination campaigns and metal recovery testing using commercial feedstocks. Receipt of the chlorination permit for our interim testing facility is expected to represent the next major scale-up milestone for the FJH program and will allow commencement of multi-unit reactive commissioning campaigns involving catalytic converter scrap and electronic waste-derived feedstocks.”*

#### METALLIUM’S FJH TECHNOLOGY DEVELOPMENT ROADMAP

Metallium utilises the Technology Readiness Level (TRL) framework to assess and communicate the maturity of its FJH technology platform. The TRL framework, originally developed by NASA and now widely adopted by U.S. Government agencies including the Department of War (DoW), Department of Energy (DOE) and other federal funding agencies, provides a structured methodology for evaluating technology development and scale-up risk.

- Metallium’s technology development roadmap is deliberately structured as a layered and parallel, stage-gated program that simultaneously advances field, laboratory and desktop development activities. The program currently utilises multiple reactor prototypes and focuses on advancing the technology across several dimensions including mechanical functionality, materials of construction (MOC), reactionary kinetics, production optimisation and end-to-end operability.
- This particular campaign utilised inert feed material and a nitrogen atmosphere to evaluate and advance reactor mechanical functionality, MOC integrity and operational confidence. Substantial learnings were generated through evaluation of reactor fluidisation behaviour, instrumentation, controls, material handling systems and multi-unit operating procedures under sustained operating conditions.

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- Importantly, the campaign was designed to validate the operating platform rather than metallurgical performance. The successful completion of the campaign provides an important data set supporting progression through TRL 5 and toward TRL 6, which focuses on integrated system validation under relevant operating environments.
- The next stage of development will involve implementation of minor design modifications, instrumentation upgrades and calibration improvements, followed by multi-unit chlorination campaigns incorporating commercial feedstocks, chlorine and proprietary catalysts.
- As a broad guide, TRL 8 is expected to correspond with demonstration-scale operation at Metallium's Texas Technology Campus, while TRL 9 represents full commercial deployment and technology transfer to additional operating sites.

### **Next Steps – Multi-Unit Chlorination Metal Recovery Campaigns**

The successful completion of the multi-unit operations campaign represents an important precursor to the Company's next phase of development. Metallium will now progress a series of parallel reactor optimisation, chlorination and commercial feedstock campaigns across its portfolio of bench-scale and commercial-scale reactor systems. This approach is designed to accelerate technology maturation while continuing to improve reactor performance, operating efficiency and production capability.

Metallium's primary reactor development building is currently undergoing roof replacement works following the identification of structural deficiencies. To maintain development momentum, the Company constructed and commissioned an interim testing facility, which successfully hosted the multi-unit operations campaign. The Company has submitted amendments to its existing permitting framework to allow chlorination activities to be conducted within the interim testing facility. Metallium is currently working with the relevant regulatory authorities and expects the permitting process to be completed in the coming weeks. Receipt of the chlorination permit represents the next major scale-up milestone for the FJH program and will enable commencement of multi-unit reactive commissioning campaigns.

Upon receipt of the necessary approvals, the Company intends to commence multi-unit chlorination campaigns at its TTC on commercial feedstocks, including catalytic converter scrap and electronic waste-derived materials. In parallel, chlorinated bench scale and desktop assessment continue to progress to continually improve Metallium's reactor technology.

These multi-unit chlorination campaigns will represent the first opportunity to evaluate chlorination chemistry, metal recovery performance and process optimisation across multiple operating units simultaneously. The campaigns are expected to generate important data relating to:

- *Multi-unit chlorination performance.*
- *Product recovery and purity.*
- *Reagent utilisation and process economics.*
- *Throughput optimisation.*
- *Commercial operating parameters.*
- *Product qualification activities.*



**Figure 2: FJH Reaction System**

### **Metallium's Next Key Scale-Up Milestones**

#### **FJH Broad Iterative Development Pathway**

- ✓ Single-unit operation
- ✓ Multi-unit inert commissioning
- ▶ Multi-unit chlorination commissioning (*expected in coming weeks, subject to permitting*)
- ▶ Commercial feedstock campaigns
- ▶ Demonstration-scale operation
- ▶ Commercial deployment

**This announcement has been authorised for release by the Board of Directors of Metallium Limited.**

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**ABOUT METALLIUM LIMITED**

**Metallium Ltd** (ABN 27 645 885 463), is pioneering a low-carbon, high-efficiency approach to recovering critical and precious metals from mineral concentrates and high-grade waste streams. The company's patented **Flash Joule Heating (FJH)** technology enables the extraction of high-value materials, including **gallium, germanium, antimony, rare earth elements, and gold** — from feedstocks such as refinery scrap, e-waste, and monazite.

Aligned with U.S. strategic supply chain objectives, Metallium has recently secured its first commercial site in Texas via its wholly owned subsidiary, **Flash Metals USA Inc.**, marking a major step toward near-term production and revenue generation.

To learn more, visit:

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**FORWARD-LOOKING STATEMENTS**

*This announcement contains forward-looking statements concerning Metallium Limited (Metallium or the Company), including statements regarding the planned deployment of additional FJH reactors, the targeted Stage-1 PCB processing capacity of approximately 8,000 tpa, potential throughput uplift relative to original internal design assumptions, expected scale-up of the FJH platform, anticipated commercial deployment activities, and the Company's future plans, strategy and objectives.*

*Forward-looking statements can generally be identified by the use of words such as "may", "will", "expect", "intend", "plan", "estimate", "anticipate", "believe", "target", "forecast", "project", "potential", "continue", "should", "seek", and similar expressions.*

*These statements are based on information available to Metallium as at the date of this announcement and on assumptions and expectations that the Company considers to be reasonable as at that date, including assumptions regarding: continued successful operation and reliability of the FJH reactor platform; the availability and characteristics of suitable feedstock; the timing and outcome of ongoing commissioning and optimisation activities; the availability of capital, equipment, personnel, services, regulatory approvals and site access required for the planned multi-reactor deployment; the absence of material adverse changes in commodity prices, exchange rates, input costs and general economic and market conditions; and continued progress of customer, partner and offtake discussions.*

*Forward-looking statements are not guarantees or predictions of future performance and involve known and unknown risks, uncertainties and other factors, many of which are beyond the Company's control. Actual results, performance or achievements may differ materially from those expressed or implied by the forward-looking statements. Such risks and uncertainties include, but are not limited to: technology scale-up and commissioning risk; feedstock supply, grade and recovery variability; processing throughput and yield variability; capital and operating cost variability; financing risk; regulatory, permitting and environmental risk; intellectual property risk; reliance on key personnel, contractors and partners; competition; and broader macroeconomic, market and geopolitical conditions.*

*Production targets, processing capacity targets, throughput indications and timelines referred to in this announcement (including the Stage-1 ~8,000 tpa PCB processing target and references to throughput uplift relative to original internal design assumptions) are targets only. They are not production forecasts and are subject to the assumptions, risks and uncertainties described above. There is no guarantee that these targets will be achieved, in the timeframes indicated or at all.*

*Investors should not place undue reliance on forward-looking statements. Except as required by the ASX Listing Rules, the Corporations Act 2001 (Cth) and applicable law, Metallium does not undertake any obligation to update or revise any forward-looking statement, whether as a result of new information, future events or otherwise.*